EXAMINER INTERVIEW SUMMARY

An Examiner Interview was held by telephone conference between Applicants' representative and Examiner Marianne Padgett on March 16, 2009. It was discussed that a range of "250 nm to 1500 nm" includes values of at least 250 nm and as less than 1500 nm. It was a agreed that the above range, which is recited in amended Claim 40, positively and clearly recites one aspect of Applicants' invention. It was also noted that U.S. Patent No. 6, 800,518 to Bendernagel et al. had been identified as a § 102(e)/§ 103(c) reference in the prior office action response dated September 24, 2008, and should not be cited as a prior art against the present claims.

REMARKS

Favorable reconsideration of this application in view of the remarks to follow is respectfully requested. Since the present Response raises no new issues, and in any event, places the application in better condition for consideration on appeal, entry thereof is respectfully requested under the provisions of 37 C.F.R. §1.116.

Claims 40, 4-6, 8-11, 16-24, 27-30, 34, and 39, stand rejected, under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the written description requirement.

Referring to page 2 of the Final Office Action, Applicants observe that the Examiner has not expressed the grounds of this rejection in a manner that allows the Applicants to adequately respond. The Examiner only states that "the claims contain subject matter which was not described in the specification in such a way as to reasonable convey to one skilled in the art that the inventor(s), at the time the application was filed, had possession of the invention."

Applicants respectfully disagree and submit that the rejection be withdrawn. "The description, clearly allows persons of ordinary skill in the art to recognize that he or she invented

what was disclosed". *In re Gosteli,* 872 F.2d 1008, 1012, 10 USPQ2d 1111, 1117 (Fed. Cir. 1989). In the event the Examiner does not withdraw this rejection, Applicants request that the Examiner more clearly state the grounds of the rejection so that the Applicants have an adequate opportunity to respond.

Claims 40, 4-6, 8-11, 16-24, 27-30, 34, and 39, stand rejected, under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the enablement requirement. Applicants traverse the aforementioned rejection and submit the following.

First, with respect to the enablement requirement, MPEP 2164 indicates that the purpose of the requirement is to ensure that the specification describes the invention in such terms that one skilled in the art can make and use the claimed invention so that the invention is communicated to the interested public in a meaningful way.

Applicants have amended Claim 40 in a manner that obviates the outstanding § 112 rejections cited by the Examiner in the Final Office Action. The amendments to Claim 40 and the outstanding rejections are now discussed in greater detail.

Referring to page 2 of the Final Office Action, the Examiner asserts that the claimed limitation regarding the depth of the n-type or p-type dopants is unclear. Applicants note that the n-type or p-type dopants may be present from the top surface of the Si-containing substrate at any depth between 250 nm to 1500 nm. This means that dopants are present in the Si-containing substrate at a depth of at least 250 nm and no greater than 1500 nm. Applicants submit that amended Claim 40 clearly allows persons of ordinary skill in the art to recognize that he or she invented what was disclosed.

Referring to the final paragraph of page 2, and the first paragraph of page 3, of the Final Office Action, the Examiner also objects to the limitations of Claim 40 which require that a

portion of the n-type or p-type doped region is converted into a porous Si region. In response to the Examiner's objections and for the purposes of advancing prosecution, Applicants have amended Claim 40 to remove the terms "at least a portion".

Referring to the second paragraph of page 3 of the Final Office Action, the Examiner also objects to Claim 40 for not specifying a sequence with respect to the claimed limitations of ion implanting p-type or n-type dopants into a Si-containing substrate, ion implanting at least one ion selected from the group consisting of Si, Ge, Ne, Bi, Sn and Xe, wherein the at least one ion may be implanted to below, above or within the depth at which the p-type or n-type dopants are present in the Si-containing substrate, and annealing the n-type or p-type dopants following the second ion implanting step to provide an activated n-type or p-type dopant region in the Si-containing substrate. Applicants have discussed this matter with Examiner. Although Applicants disagree with the requirement that the claims recite a sequence, in the interest of advancing prosecution, Applicants have now amended Claim 40 to recite that the n-type or p-type dopant implantation step is conducted first, followed by the ion implantation of the ion selected from the group consisting of Si, Ge, Ne, Bi, Sn and Xe, followed by the annealing step to activate the n-type and p-type dopants. Support for this amendment to Claim 40 is found in paragraphs 35, 36 and 39-46 of Applicants' specification. In light of the amendment, to Claim 40, the Examiner's objection for failing to recite a limitation to the sequence of the method steps has been obviated. Applicants have also amended dependent Claims 4 and 34 to be consistent with the amendments to Claim 40.

Referring to the last paragraph of page 3 and the first paragraph of page 4 of the Final Office Action, the Examiner objects to the phrase "and a remaining portion of the porous silicon region provides a silicon-containing over layer". In response to the Examiner's comments and

for the purposes of advancing prosecution, Applicants have amended Claim 40 to recite that the "porous Si region coalesces to provide a Si-containing overlayer". Support for this amendment to Claim 40 is found in paragraph 0058 of Applicants' disclosure. Applicants submit that this amendment to Claim 40 overcomes the Examiner's objection that is recited in the last paragraph of page 3 and the first paragraph of page 4 of the Final Office Action.

Applicants submit that the § 112 rejections have been obviated by the amendments to Claim 40.

Claims 40, 4-6, 8-11, 16-24, 27-30, 34 &39 stand rejected, under 35 U.S.C. § 112, second paragraph, for allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regards at the invention. Applicants traverse the aforementioned rejection and submit the following.

Referring to Page 4 of the Final Office Action, the Examiner states the following:

> "The claim 40 limitation concerning the ion implantation of the n- or p-type dopant while now consistent with the disclosure on [0039], remains uncertain or ambiguous as to whether the depth referred to is a range of maximum depths measured from the top of the substrate, or if the claim depth represents a thickness as measured from the top of the substrate starting at 250 nm going down to 1500 nm."

As indicated above, and discussed in the Examiner Interview dated March 16, 2009, the claimed range for the depth of the n-type or p-type dopants is the range of depths at which the dopants may be present in the Si-containing substrate as measured from the top surface of the Si-containing substrate, in which the dopants are present at a depth of at least 250 nm and less than 1500 nm. Applicants submit that the range recited in amended Claim 40 is clear to one of

ordinary skill in the art. In light of the above, Applicants submit that the § 112 rejections have been obviated and respectfully request withdrawal thereof.

Claims 4-6, 8-11, 16-24, 27-30, 34 and 39-40 stand rejected under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent No. 5,387, 541 to Hodge et al. ("Hodge et al.") in view of JP 62-245620 to Hiromitsu et al. ("Hiromitsu et al.") and U.S. Patent No. 6, 800,518 to Bendernagel et al. ("Bendernagel et al."). Applicants traverse the aforementioned rejection and submit the following.

Before addressing the prior art, as previously indicated in the Office Action response dated September 24, 2008, Applicants again indicate that Bendernagel et al. is disqualified from being prior art. Applicants submit that the statute under 35 U.S.C. §103(c) states that:

> Subject matter developed by another person, which qualifies as prior art only under one or more subjections (e), (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Applicants submit that the Bendernagel et al. reference was applied by the Examiner as prior art under 35 U.S.C. §103 via 35 U.S.C. §102(e). Applicants note in this regard that MPEP §706.02(k) states that:

> Effective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

In view of this, and the fact the present application and Bendernagel et al. "were, at the time the invention was made, owned by the same person or subject to an obligation of

assignment to the same person", the Bendernagel et al. reference is disqualified as a reference under 35 U.S.C. §103(c).

To evidence that the instant application and Bendernagel et al. "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person", the assignment document of the present application (recordation date September 30, 2003 at Reel 014564, Frame 0494) was compared with the recorded assignment of Bendernagel et al. (recordation date June 30, 2003 at Reel 014226, Frame 0331). In both instances, the inventors conveyed their entire interest to International Business Machines Corporation; therefore establishing common ownership between the instant application and Bendernagel et al. In view of the above information, Bendernagel et al. is disqualified as art. Therefore, the present §103 rejection may only be based upon Hodge et al. and Hiromitsu et al.

Applicants submit that the Hodge et al. fails to render Applicants' invention obvious, since Hodge et al. fails to teach or suggest each and every limitation of Applicants' claimed method, as recited in amended Claim 40. Specifically, Hodge et al. fails to teach or suggest a method of fabricating a silicon-on-insulator substrate including a process sequence of a first ion implanting step to implant p-type or n-type dopants into a Si-containing substrate to a depth ranging from 250 nm to 1500 nm from a top surface of the Si-containing substrate; a second ion implanting step following the first ion implanting step to implant at least one ion selected from the group consisting of Si, Ge, Ne, Bi, Sn and Xe, wherein the at least one ion may be implanted to below, above or within the depth at which the p-type or n-type dopants are present in the Si-containing substrate; annealing the n-type or p-type dopants following the second ion implanting step to provide an activated n-type or p-type dopant region in the Si-containing substrate;

performing an electrolytic anodization process comprising immersing the Si-containing substrate into an HF-containing solution and applying a current density ranging from 0.05 milliAmps/cm^2 to 50 milliAmps/cm^2 to the Si-containing substrate to produce a porous Si region having a porosity of 0.01% or greater at a depth greater than 50 nm from the upper surface of the Si-containing substrate, wherein the electrolytic anodization process converts the activated n-type or p-type dopant region into the porous Si region; and thermal oxidizing at a temperature ranging from 650°C to 1350°C to convert at least a portion of the porous Si region into a buried oxide region, wherein a portion of the Si-containing substrate overlying the buried oxide region and a remaining portion of the porous Si region coalesces to provide a Si-containing overlayer, as recited in amended Claim 40.

Hodge et al. discloses a process that includes providing a porous silicon layer by anodization (see Figures 1-2, and column 2, line 35, to column 3, line 5, of Hodge et al. reference); ion implantation to produce an amorphous region in the porous Si (see Figures 1 and 2, and column 3, lines 5-35 of the Hodge et al. reference); and annealing to recrystallize the amorphous Si in providing the SOI layer of a silicon on insulator substrate (see column 3, lines 35-65 of the Hodge et al. reference). The sequence disclosed in Hodge et al. fails to meet Applicants' claimed method, because Hodge et al. produces a porous Si region by anodization prior to ion implantation. Contrary to the method disclosed in Hodge et al., Applicants' method includes an implant of n-type or p-type dopants, as well as another implant of an ion selected from the group consisting of Si, Ge, Ne, Bi, Sn and Xe, prior to the electrolytic anodization, as recited in amended Claim 40. Amended Claim 40 requires a sequence of implantation prior to electrolytic anodization, because the activated n-type or p-type region that is recited in amended Claim 40 is provided by the above noted implantations steps, and Claim 40 specifically recites

that the electrolytic anodization process converts at least a portion of the activated n-type or p-type dopant region into the porous Si region. Hodge et al. fails to provide this method sequence.

Hodge et al. also fails to teach forming an SOI layer during oxidation. Instead, Hodge et al. relies on a recrystallization step to grow an SOI layer from an amorphous Si region, which does not meet the limitation of an oxidation step that provides both the SOI layer and buried oxide layer, as required by amended Claim 40. Although, Hodge et al. discloses embodiments including oxidation steps following, and prior to, the formation of the SOI layer, the applied reference requires a separate anneal step in a non-oxidizing environment, i.e., an anneal including argon or nitrogen anneal (see column 3, lines 60-65, of Hodge et al.), to produce the SOI layer from a recrystallized growth of Si from an amorphous Si region.

Hiromitsu fails to fulfill the deficiencies of Hodge et al., because Hiromitsu also fails to teach or suggest each and every limitation of Applicants' method, as recited in amended Claim 40. Hiromitsu discloses a method that forms a Si seed layer atop an insulating substrate. More specifically, Hiromitsu forms a Si-containing seed in an insulating layer, followed by the deposition of an amorphous Si layer atop the insulating layer, wherein the Si-seed embedded in the insulating layer is utilized to convert the amorphous Si layer that is present atop the insulating layer into single crystal Si. Therefore, Hiromitsu is far removed from Applicants' method.

Specifically, Hiromitsu fails to teach or suggest a method of fabricating a silicon-on-insulator substrate comprising a process sequence that includes a first ion implanting step to implant p-type or n-type dopants into a Si-containing substrate to a depth ranging from 250 nm to 1500 nm from a top surface of the Si-containing substrate; a second ion implanting step following the first ion implanting step to implant at least one ion selected from the group consisting of Si, Ge, Ne, Bi, Sn and Xe, wherein the at least one ion may be implanted to below,

above or within the depth at which the p-type or n-type dopants are present in the Si-containing substrate; annealing the n-type or p-type dopants following the second ion implanting step to provide an activated n-type or p-type dopant region in the Si-containing substrate; performing an electrolytic anodization process comprising immersing the Si-containing substrate into an HF-containing solution and applying a current density ranging from 0.05 milliAmps/cm^2 to 50 milliAmps/cm^2 to the Si-containing substrate to produce a porous Si region having a porosity of 0.01% or greater at a depth greater than 50 nm from the upper surface of the Si-containing substrate, wherein the electrolytic anodization process converts the activated n-type or p-type dopant region into the porous Si region; and thermal oxidizing at a temperature ranging from 650°C to 1350°C to convert at least a portion of the porous Si region into a buried oxide region, wherein a portion of the Si-containing substrate overlying the buried oxide region and a remaining portion of the porous Si region coalesces to provide a Si-containing overlayer, as recited in amended Claim 40.

Figures 2(a)-2(d) of the Hiromitsu disclosure, which are directed to the portion of the reference that the Examiner has cited in the present Office Action, illustrate a method of forming an oxide layer atop a semiconductor substrate. Applicants observe that the method illustrated in Figures 2(a)-2(d) and described on Pages 6-7 of the Hiromitsu disclosure, fails to provide a method that includes converting at least a portion of an activated n-type or p-type dopant region into a porous Si region, and then thermal oxidizing the structure to convert at least a portion of the porous Si region into a buried oxide region, wherein a portion of the Si-containing substrate overlying the buried oxide region and *a remaining portion of the porous Si region coalesces to provide a Si-containing overlayer*, as recited in amended Claim 40. Hiromitsu clearly discloses that the entire portion of the substrate that is implanted during the boron ion implantation 7 or the

proton ion implantation are subsequently processed to provide silicon oxide 2, therefore failing to meet the limitation of a method in which at least a portion of the Si-containing substrate overlying the buried oxide region and *a remaining portion of the porous Si region coalesces to provide* a Si-containing overlayer, as recited in amended Claim 40.

In view of the above, Hiromitsu fails to teach or suggest each and every limitation of Applicants' claimed method, as recited in amended Claim 40.

Applicants submit that the §103 rejection citing the combined disclosures of Hodge et al. and Hiromitsu have been obviated and request withdrawal thereof.

Accordingly, the Examiner is respectfully requested to reconsider the application, withdraw the rejections and issue an immediate a favorable action thereon. If upon review of the application, the Examiner is unable issue an immediate Notice of Allowance, the Examiner is respectfully requested to telephone the undersigned with a view towards resolving any outstanding issues.

An early and favorable action is earnestly solicited.

Respectfully Submitted,

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